

In the Claims:

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13. (Cancel)

14. (Cancel)

15. (New) A compound of the formula I



where B, G and L have the following meanings:

L is a structural element of the formula I_L



where

T is COOH, COO-C₁₋₈-alkyl or COO-benzyl, and

-U- is -(X_L)_a-(CR_L¹R_L²)_b- or =CR_L¹-,

where

a is 0 or 1,

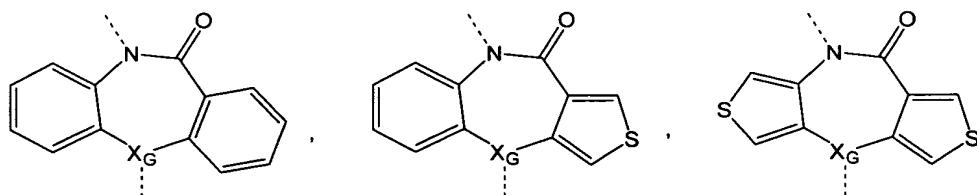
b is 0, 1 or 2,

X_L is CR_L³R_L⁴ or oxygen

R_L¹, R_L², R_L³ and R_L⁴

are, independently of one another, hydrogen, a halogen radical, a branched or unbranched, optionally substituted C₁-C₄-alkyl, C₁-C₄-alkoxy radical, or in each case independently of one another, two radicals R_L¹ and R_L² or R_L³ and R_L⁴ or, where appropriate, R_L¹ and R_L³ together are an optionally substituted 3- to 7-membered cycloalkyl radical

G is a structural element of the group selected from



where

the structural element G can be incorporated in both orientations, and

X_G is nitrogen or CR_G ¹ in the case where structural element G is connected to structural element L or B via X_G by a single bond,

or

is carbon in the case where structural element G is connected to structural element L via X_G by a double bond,

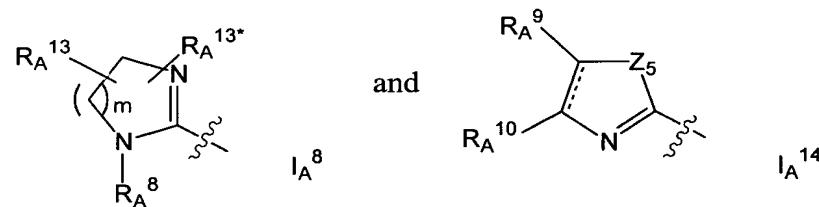
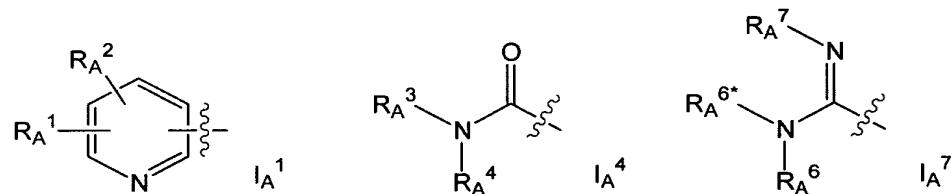
where the rings fused on the 7-membered ring of the structural element G are optionally substituted,

B is a structural element of the formula I_B



where A and E have the following meanings:

A is a structural element selected from the group of structural elements of the formulae I_A¹, I_A⁴, I_A⁷, I_A⁸, I_A¹⁴:



where

m is 1, 2 or 3

R_A^1 and R_A^2

are, independently of one another, hydrogen, CN, halogen, a branched or unbranched, optionally substituted C₁-C₆-alkyl or CO-C₁-C₆-alkyl radical or an optionally substituted aryl, arylalkyl, hetaryl, hetarylalkyl or C₃-C₇-cycloalkyl radical or a radical CO-O-R_A¹⁴, O-R_A¹⁴, S-R_A¹⁴, NR_A¹⁵R_A¹⁶, CO-NR_A¹⁵R_A¹⁶ or SO₂NR_A¹⁵R_A¹⁶ or the two R_A¹ and R_A² radicals together are a fused-on, optionally substituted 5- or 6-membered, unsaturated or aromatic carbocyclic or heterocyclic system which may contain up to three heteroatoms selected from the group of O, N and S,

R_A¹³ and R_A^{13*}

are, independently of one another, hydrogen, CN, halogen, a branched or unbranched, optionally substituted C₁-C₆-alkyl radical or an optionally substituted aryl, arylalkyl, hetaryl, C₃-C₇-cycloalkyl radical or a CO-O-R_A¹⁴, O-R_A¹⁴, S-R_A¹⁴, NR_A¹⁵R_A¹⁶ or CO-NR_A¹⁵R_A¹⁶ radical,

where

R_A¹⁴ is hydrogen, a branched or unbranched, optionally substituted C₁-C₆-alkyl, alkylene-C₁-C₄-alkoxy, C₂-C₆-alkenyl, C₂-C₆-alkynyl or alkylene-cycloalkyl radical or an optionally substituted C₃-C₇-cycloalkyl, aryl, arylalkyl, hetaryl or hetarylalkyl radical,

R_A¹⁵ and R_A¹⁶,

are, independently of one another, hydrogen, a branched or unbranched, optionally substituted C₁-C₆-alkyl, CO-C₁-C₆-alkyl, SO₂-C₁-C₆-alkyl, COO-C₁-C₆-alkyl, arylalkyl, COO-alkylene-aryl, SO₂-alkylene-aryl or hetarylalkyl radical or an optionally substituted C₃-C₇-cycloalkyl, aryl, CO-aryl, SO₂-aryl, hetaryl or CO-hetaryl radical,

R_A³ and R_A⁴

are, independently of one another, hydrogen, -(CH₂)_n-(X_A)_j-R_A¹², or the two radicals together are a 3-to 8-membered, saturated, unsaturated or aromatic

N heterocyclic system which may additionally contain two other identical or different heteroatoms O, N or S, it being possible for the ring optionally to be substituted or for another, optionally substituted, saturated, unsaturated or aromatic ring to be fused onto this ring,

where

n is 0, 1, 2 or 3,

j is 0 or 1,

X_A is $-\text{SO}_2-$, $-\text{S}-$, $-\text{O}-$, $-\text{CO}-$, $-\text{O}-\text{CO}-$, $-\text{CO}-\text{O}-$, $-\text{CO}-\text{N}(\text{R}_A^{12})-$, $-\text{N}(\text{R}_A^{12})-\text{CO}-$, $-\text{N}(\text{R}_A^{12})-\text{SO}_2-$ or $-\text{SO}_2-\text{N}(\text{R}_A^{12})-$ and

R_A^{12} is hydrogen, a branched or unbranched, optionally substituted $\text{C}_1\text{-C}_6$ -alkyl, $\text{C}_1\text{-C}_4$ -alkoxy, -O-alkylene-aryl or -O-aryl radical, an amino radical with primary or, where appropriate, secondary or tertiary Substitution, an optionally $\text{C}_1\text{-C}_4$ -alkyl- or aryl-substituted $\text{C}_2\text{-C}_6$ -alkynyl or $\text{C}_2\text{-C}_6$ -alkenyl radical or a 3- to 6-membered, saturated or unsaturated heterocyclic system which is substituted by up to three identical or different radicals and which may contain up to three different or identical heteroatoms O, N, S, $\text{C}_3\text{-C}_7$ -cycloalkyl, aryl or hetaryl radical, it being possible for two radicals together to be a fused-on, saturated, unsaturated or aromatic carbocyclic or heterocyclic system which may contain up to three different or identical heteroatoms O, N, S, and the ring may optionally be substituted, or another, optionally substituted, saturated, unsaturated or aromatic ring may be fused onto this ring,

R_A^6 and R_A^{6*}

are hydrogen, a branched or unbranched, optionally substituted $\text{C}_1\text{-C}_4$ -alkyl, $-\text{CO}-\text{O}-\text{C}_1\text{-C}_4$ -alkyl, arylalkyl, $-\text{CO}-\text{O}$ -alkylene-aryl, $-\text{CO}-\text{O}$ -allyl, $-\text{CO}-\text{C}_1\text{-C}_4$ -alkyl, $-\text{CO}$ -alkylene-aryl, $\text{C}_3\text{-C}_7$ -cycloalkyl or $-\text{CO}$ -allyl radical or the two radicals R_A^6 and R_A^{6*} in the structural element I_A^7 together are an

optionally substituted, saturated, unsaturated or aromatic heterocyclic system which may, in addition to the ring nitrogen, contain up to two further different or identical heteroatoms O, N, S,

R_A^7 is hydrogen, -OH, -CN, -CONH₂, a branched or unbranched, optionally substituted C₁-C₄-alkyl, C₁-C₄-alkoxy, C₃-C₇-cycloalkyl or -O-CO-C₁-C₄-alkyl radical, or an optionally substituted arylalkyl, -O-alkylene-aryl, -O-CO-aryl, -O-CO-alkylene-aryl or -O-CO-allyl radical, or the two radicals R_A^6 and R_A^7 together are an optionally substituted, unsaturated or aromatic heterocyclic system which may, in addition to the ring nitrogen, contain up to two further different or identical heteroatoms O, N, S,

R_A^8 is hydrogen, a branched or unbranched, optionally substituted C₁-C₄-alkyl, CO-C₁-C₄-alkyl, SO₂-C₁-C₄-alkyl or CO-O-C₁-C₄-alkyl radical or an optionally substituted aryl, CO-aryl, SO₂-aryl, CO-O-aryl, CO-alkylene-aryl, SO₂-alkylene-aryl, CO-O-alkylene-aryl or alkylene-aryl radical,

R_A^9 and R_A^{10}

are, independently of one another, hydrogen, -CN, halogen, a branched or unbranched, optionally substituted C₁-C₆-alkyl radical or an optionally substituted aryl, arylalkyl, hetaryl, C₃-C₇-cycloalkyl radical or a CO-O- R_A^{14} , O- R_A^{14} , S- R_A^{14} , NR_A¹⁵R_A¹⁶ or CO-NR_A¹⁵R_A¹⁶ radical, or the two R_A^9 and R_A^{10} radicals in the structural element I_A^{14} together are a 5- to 7-membered saturated, unsaturated or aromatic carbocyclic or heterocyclic system which may contain up to three different or identical heteroatoms O, N, S and is optionally substituted by up to three identical or different radicals,

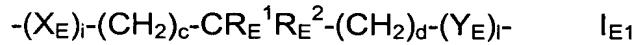
Z^5 is NR_A⁸, oxygen or sulphur,

and

E is a spacer structural element which connects structural element A to structural element G covalently, wherein the spacer structural element E is

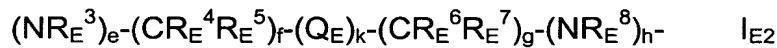
composed of two to four partial structural elements selected from the group of E^1 and E^2 , the partial structural elements being linked in any sequence, and E^1 and E^2 having the following meanings:

E^1 is a partial structural element of the formula I_{E1}



and

E^2 is a partial structural element of the formula I_{E2}



where

c, d, f and g

are, independently of one another, 0, 1 or 2,

e, h, i, k and l ,

are, independently of one another, 0 or 1,

X_E and Q_E

are, independently of one another, CO, CO-NR_E⁹, S, SO, SO₂, SO₂NR_E⁹, CS, CS-NR_E⁹, CS-O, CO-O, O-CO, O, ethynyl, CR_E¹⁰-O-CR_E¹¹, CR_E¹⁰R_E¹¹-, C(=CRE¹⁰R_E¹¹), CR_E¹⁰=CR_E¹¹-, CR_E¹⁰(OR_E¹²)-CR_E¹¹, CR_E¹⁰-CR_E¹¹(OR_E¹²) or an optionally substituted 4- to 11-membered mono- or polycyclic aliphatic or aromatic hydrocarbon which may contain up to 6 double bonds and up to 6 heteroatoms selected from the group of N, O, S,

Y_E is -CO-, -NR_E⁹-CO-, -SO-, -SO₂-, -NR_E⁹-SO₂-, -CS-, -NR_E⁹-CS-, -O-CS- or -O-CO-

$R_E^1, R_E^2, R_E^4, R_E^5, R_E^6$ and R_E^7

are, independently of one another, hydrogen, halogen, a hydroxyl group, a branched or unbranched, optionally substituted C₁-C₆-alkyl, C₁-C₄-alkoxy,

C_2 - C_6 -alkenyl, C_2 - C_6 -alkynyl or alkylene-cycloalkyl radical, a $-(CH_2)_w-R_E^{13}$ radical, an optionally substituted C_3 - C_7 -cycloalkyl, aryl, arylalkyl, hetaryl, hetarylalkyl, O-aryl or O-alkylene-aryl radical, or, independently of one another, in each case two radicals R_E^1 and R_E^2 or R_E^4 and R_E^5 or R_E^6 and R_E^7 together are a 3- to 7-membered, optionally substituted, saturated or unsaturated carbocyclic system,

where

w is 0, 1, 2, 3 or 4,

R_E^3 , R_E^8 and R_E^9

are, independently of one another, hydrogen, a branched or unbranched, optionally substituted C_1 - C_6 -alkyl, $CO-C_1-C_6$ -alkyl, $CO-O-C_1-C_6$ -alkyl or $SO_2-C_1-C_6$ -alkyl radical or an optionally substituted C_3 - C_7 -cycloalkyl, $CO-O$ -alkylene-aryl, CO -alkylene-aryl, CO -aryl, SO_2 -aryl, CO -hetaryl or SO_2 -alkylene-aryl radical,

R_E^{10} and R_E^{11}

are, independently of one another, hydrogen, a hydroxyl group, a branched or unbranched, optionally substituted C_1 - C_6 -alkyl, C_1 - C_4 -alkoxy, C_2 - C_6 -alkenyl, C_2 - C_6 -alkynyl or alkylene-cycloalkyl radical or an optionally substituted C_3 - C_7 -cycloalkyl, aryl, arylalkyl, hetaryl or hetarylalkyl radical,

R_E^{12} is hydrogen, a branched or unbranched, optionally substituted C_1 - C_6 -alkyl, C_2 - C_6 -alkenyl, C_2 - C_6 -alkynyl or alkylene-cycloalkyl radical or an optionally substituted C_3 - C_7 -cycloalkyl, aryl, arylalkyl, hetaryl or hetarylalkyl radical,

R_E^{13} is hydrogen, a hydroxyl group, a branched or unbranched, optionally substituted C_1 - C_6 -alkyl, C_1 - C_4 -alkoxy, -arylalkyl, -O-alkylene-aryl or -O-aryl radical, an amino radical with primary or, where appropriate, secondary or tertiary substitution, be an optionally C_1 - C_4 -alkyl- or aryl-substituted C_2 - C_6 -alkynyl or C_2 - C_6 -alkenyl radical, a C_5 - C_{12} -bicycloalkyl,

C_6 - C_{18} -tricycloalkyl radical, a $CO-O-R_A^{14}$ radical, or a 3- to 6-membered, saturated or unsaturated heterocyclic system which is substituted by up to three identical or different radicals and which may contain up to three different or identical heteroatoms O, N, S, C_3 - C_7 -cycloalkyl, aryl or hetaryl radical, it being possible for two radicals together to be a fused-on, saturated, unsaturated or aromatic carbocyclic or heterocyclic system which may contain up to three different or identical heteroatoms O, N, S, and the ring may optionally be substituted or another, optionally substituted, saturated, unsaturated or aromatic ring may be fused onto this ring,

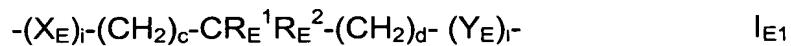
and the physiologically tolerated salt, prodrugs and the enantiomerically pure or diastereomerically pure and tautomeric forms.

16. (New) A compound as claimed in claim 15, wherein the spacer structural element E used is a structural element of the formula I_{E1E2}



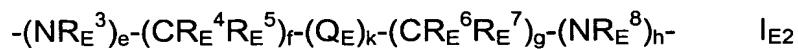
and E^1 and E^2 have the following meanings:

E^1 is a partial structural element of the formula I_{E1}



and

E^2 is a partial structural element of the formula I_{E2}



where

c, d, f and g

are, independently of one another, 0, 1 or 2

e, h, i, k and l

are, independently of one another, 0 or 1,

X_E and Q_E

are, independently of one another, CO, CO-NR_E⁹, S, SO, SO₂, SO₂NR_E⁹, CS, CS-NR_E⁹, CS-O, CO-O, O-CO, O, ethynyl, CR_E¹⁰-O-CR_E¹¹, CR_E¹⁰R_E¹¹, C(=CR_E¹⁰R_E¹¹), CR_E¹⁰CR_E¹¹, CR_E¹⁰(OR_E¹²)-CR_E¹¹, CR_E¹⁰-CR_E¹¹-(OR_E¹²) or an optionally substituted 4- to 11-membered mono- or polycyclic aliphatic or aromatic hydrocarbon which may contain up to 6 double bonds and up to 6 heteroatoms selected from the group of N, O, S,

Y_E is -CO-, -NR_E⁹-CO-, -SO-, -SO₂-, -NR_E⁹-SO₂-, -CS-, -NR_E⁹-CS-, -O-CS- or -O-CO-

R_E¹, R_E², R_E⁴-R_E⁵, R_E⁶ and R_E⁷

are, independently of one another, hydrogen, halogen, a hydroxyl group, a branched or unbranched, optionally substituted C₁-C₆-alkyl, C₁-C₄-alkoxy, C₂-C₆-alkenyl, C₂-C₆-alkynyl or alkylene-cycloalkyl radical, a -(CH₂)_w-R_E¹³ radical, an optionally substituted C₃-C₇-cycloalkyl, aryl, arylalkyl, hetaryl, hetarylalkyl, O-aryl or O-alkylene-aryl radical, or, independently of one another, in each case two radicals R_E¹ and R_E² or R_E⁴ and R_E⁵ or R_E⁶ and R_E⁷ together are a 3- to 7-membered, optionally substituted, saturated or unsaturated carbocyclic system,

where

w is 0, 1, 2, 3 or 4,

R_E³, R_E⁸ and R_E⁹

are, independently of one another, hydrogen, a branched or unbranched, optionally substituted C₁-C₆-alkyl, CO-C₁-C₆-alkyl, CO-O-C₁-C₆-alkyl or SO₂-C₁-C₆-alkyl radical or an optionally substituted C₃-C₇-cycloalkyl, CO-O-alkylene-aryl, CO-alkylene-aryl, CO-aryl, SO₂-aryl, CO-hetaryl or

SO₂-alkylene-aryl radical,

R_E¹⁰ and R_E¹¹

are, independently of one another, hydrogen, a hydroxyl group, a branched or unbranched, optionally substituted C₁-C₆-alkyl, C₁-C₄-alkoxy,

C₂-C₆-alkenyl, C₂-C₆-alkynyl or alkylene-cycloalkyl radical or an optionally substituted C₃-C₇-cycloalkyl, aryl, arylalkyl, hetaryl or hetarylalkyl radical,

R_E¹² is hydrogen, a branched or unbranched, optionally substituted C₁-C₆-alkyl, C₂-C₆-alkenyl, C₂-C₆-alkynyl or alkylene-cycloalkyl radical or an optionally substituted C₃-C₇-cycloalkyl, aryl, arylalkyl, hetaryl or hetarylalkyl radical, and

R_E¹³ is hydrogen, a hydroxyl group, a branched or unbranched, optionally substituted C₁-C₆-alkyl, C₁-C₄-alkoxy, arylalkyl, -O-alkylene-aryl or -O-aryl radical, an amino radical with primary or, where appropriate, secondary or tertiary substitution, an optionally C₁-C₄-alkyl- or aryl-substituted C₂-C₆-alkynyl or C₂-C₆-alkenyl radical, a C₅-C₁₂-bicycloalkyl, C₆-C₁₈tricycloalkyl radical, a CO-O-R_A¹⁴ radical, or a 3- to 6-membered, saturated or unsaturated heterocyclic system which is substituted by up to three identical or different radicals and which may contain up to three different or identical heteroatoms O, N, S, C₃-C₇-cycloalkyl, aryl or hetaryl radical, it being possible for two radicals together to be a fused-on, saturated, unsaturated or aromatic carbocyclic or heterocyclic system which may contain up to three different or identical heteroatoms O, N, S, and the ring may optionally be substituted, or another, optionally substituted, saturated, unsaturated or aromatic ring may be fused onto this ring.

17. (New) A process for preparing compounds which bind to integrin receptors, said process comprising using a structural element of the formula I_{GL}

-G-L

I_{GL}

where G and L have the following meanings:

L is a structural element of the formula I_L ;

-U-T I_L

where

T is COOH, COO-C₁₋₈-alkyl or COO-benzyl, and

-U- is -(X_L)_a- (CR_L¹R_L²)_b- or =CR_L¹-,

where

a is 0 or 1,

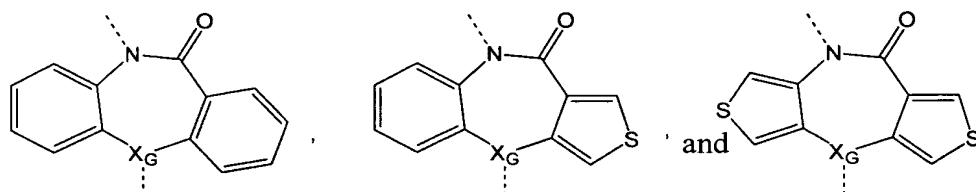
b is 0, 1 or 2,

X_L is CR_L³R_L⁴ or oxygen

R_L¹, R_L², R_L³ and R_L⁴

are, independently of one another, hydrogen, -NR_L⁶R_L⁷, a halogen radical, a branched or unbranched, optionally substituted C₁-C₄-alkyl, C₁-C₄-alkoxy radical, or in each case independently of one another, two radicals R_L¹ and R_L² or R_L³ and R_L⁴ or, where appropriate, R_L¹ and R_L³ together are an optionally substituted 3- to 7-membered cycloalkyl radical

G is a structural element of the group selected from formula I_G



where

the structural element G can be incorporated in both orientations, and

X_G is nitrogen or CR_G^1 in the case where structural element G is connected to structural element L or B via X_G by a single bond,

or

is carbon in the case where structural element G is connected to structural element L via X_G by a double bond,

where the rings fused on the 7-membered ring are optionally substituted.

18. (New) A drug comprising the structural element of the formula I_{GL}



where G and L have the following meanings:

L is a structural element of the formula I_L



where

T is $COOH$, $COO-C_{1-8}$ -alkyl or COO -benzyl, and

-U- is $-(X_L)_a-(CR_L^1R_L^2)_b-$ or $=CR_L^1-$,

where

a is 0 or 1,

b is 0, 1 or 2,

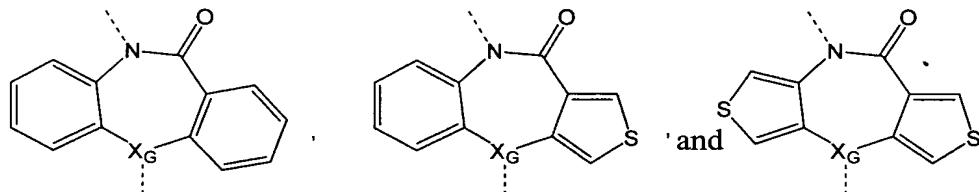
X_L is $CR_L^3R_L^4$ or oxygen

R_L^1 , R_L^2 , R_L^3 and R_L^4

are, independently of one another, hydrogen, $-NR_L^6R_L^7$, a halogen radical, a branched or unbranched, optionally substituted C_1-C_4 -alkyl,

C₁-C₄-alkoxy radical, or in each case independently of one another, two radicals R_L¹ and R_L² or R_L³ and R_L⁴ or, where appropriate, R_L¹ and R_L³ together are an optionally substituted 3- to 7-membered cycloalkyl radical

G is a structural element of the group selected from formula I_G



where

the structural element G can be incorporated in both orientations, and

X_G is nitrogen or CR_G¹ in the case where structural element G is connected to structural element L or B via X_G by a single bond,

or

is carbon in the case where structural element G is connected to structural element L via X_G by a double bond,

where the rings fused on the 7-membered ring are optionally substituted.

19. (New) A pharmaceutical preparation for oral or parenteral use, comprising at least one compound as claimed in Claim 15 in addition to conventional pharmaceutical excipients.
20. (New) A process for the treatment of diseases in which the interaction between integrins and their natural ligands is excessive, said process comprising administering an effective amount of a drug produced from the compound of claim 15 to a mammal.

21. (New) The process as claimed in claim 20 wherein the disease is one in which the interaction between $\alpha_v\beta_3$ integrin and its natural ligands is excessive.

22. (New) The process as claimed in claim 21 wherein the disease is atherosclerosis, restenosis after vessel injury, angioplasty, acute kidney failure, angiogenesis-associated microangiopathies, arterial thrombosis, stroke, angiogenesis, tumor growth and metastasis, cancer, osteoporosis, high blood pressure, psoriasis or viral, parasitic or bacterial diseases, inflammations, hyperparathyroidism, Paget's disease, malignant hypercalcemia or metastatic osteolytic lesions.